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Serial No.: 10/712,444

Filing Date: 11/13/2003

Attorney Docket No. H005690-5601

Title: THIN FILM DEPOSITION METHODS AND APPARATUSES

Amendments to the Claims

The following listing of claims will replace all prior versions and listings of claims in the application:

Listing of Claims

1. (currently amended) A method for providing reactive material enclosed by covering material on a substrate, the method comprising

providing a substrate having a surface,

providing a shadow mask,

positioning the shadow mask and substrate in a fixture so the shadow mask is in a position to align an aperture of the shadow mask with a portion of the surface,

positioning the shadow mask and substrate in a vacuum deposition chamber having a reactive material deposition source and a covering material deposition source,

providing a vacuum in the vacuum deposition chamber,

evaporating reactive material from the reactive material deposition source such that the reactive material passes through the aperture of the shadow mask and deposits on the surface to define an area of coverage of the reactive material, the reactive material comprising rubidium, cesium, gallium, potassium, or sodium, and

evaporating covering material from the covering material deposition source to produce an area of coverage of the covering material that is greater than the area of coverage of the reactive material and that includes the area of coverage of the reactive material, to enclose the reactive material coated on the substrate.

2. (original) The method of claim 1 wherein the area of coverage of the covering material is from 0.1 to 10 percent greater than the area of coverage of the reactive material.

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3. (currently amended) The method of claim 1 comprising rotating the substrate on an axis through the ~~portions~~ portion of surface and perpendicular to the portion of surface, during evaporation of the covering material,

and wherein the covering material deposition source is located at an angle oblique to the axis.

4. (previously presented) The method of claim 1 comprising positioning the shadow mask and substrate in the fixture to fix the shadow mask against the substrate.

5. (currently amended) The method of claim 4 wherein the shadow mask aperture is a distance in the range from about 20 ~~microns~~ to 100 microns from the portion of surface.

6. (canceled)

7. (original) The method of claim 5 wherein

when the reactive material comprises rubidium, the covering material comprises aluminum; and

when the reactive material comprises gallium, the covering material comprises tungsten.

8. (currently amended) The method of claim 1 comprising depositing a layer of reactive material having a thickness in the range from about 0.5 to 10 microns.

9. (original) The method of claim 1 comprising depositing a layer of covering material over the deposited reactive material, the covering material having a thickness of from about 0.5 to 10 microns.

10. (original) The method of claim 1 wherein during evaporating of the reactive material, the substrate is rotated on an axis normal to and through the portion of surface.

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11. (currently amended) The method of claim 1 wherein during evaporating of the covering material, the substrate is rotated on an axis normal to and through the portion of surface, at a speed in the range from about 10 revolutions per second to about 1 revolution per 5 seconds.

12. (currently amended) The method of claim 11 wherein the covering material deposition source is at an angle of incidence in the range from about 1 to 10 degrees from the axis.

13. (currently amended) A method for providing layers of material on a substrate, the method comprising

providing a substrate including a surface,

fixing a shadow mask over the substrate in a position to align an aperture of the shadow mask with a portion of the surface,

positioning the shadow mask and substrate in a vacuum deposition chamber having a first material deposition source and a second material deposition source,

providing a vacuum in the vacuum deposition chamber,

evaporating first material from the first material deposition source at an angle of incidence substantially normal to the portion of surface, such that the first material passes through the aperture of the shadow mask and deposits on the portion of surface to define an area of coverage of the first material, the first material comprising rubidium, cesium, gallium, potassium, or sodium and

while rotating the substrate and shadow mask on an axis normal to the portion of surface, evaporating second material from the second material deposition source at an angle of incidence oblique to the axis, such that second material passes through the aperture of the shadow mask and deposits on the first material to produce an area of coverage of the second material greater than the area of coverage of the first material and including the area of coverage of the first material.

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14-20. (canceled)

21. (previously presented) A method of preparing a microelectronic mechanical device, the method comprising

depositing first material onto a substrate surface,

depositing second material over the first material from an oblique angle relative to the substrate surface to enclose the first material,

encapsulating the first and second materials deposited on the substrate within a cavity, and

degrading the second material so that at least a portion of the first material escapes into the cavity.

22. (original) The method of claim 21 wherein the first material is a reactive material.

23. (original) The method of claim 21 wherein the second material is a degradable material that can be degraded by heat or laser radiation.

24. (previously presented) The method of claim 21 wherein the step of encapsulating the first and second materials comprises forming an enclosure that comprises a material that is transparent to laser radiation.

25. (original) The method of claim 24 comprising degrading the second material by laser irradiation.

26. (original) The method of claim 21 comprising degrading the second material by heating the second material.

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27. (previously presented) A method for providing reactive material enclosed by covering material on a substrate, the method comprising

providing a substrate having a surface,

fixing a shadow mask over the substrate in a position to align an aperture of the shadow mask with a portion of the surface,

positioning the shadow mask and substrate in a vacuum deposition chamber having a reactive material deposition source and a covering material deposition source,

providing a vacuum in the vacuum deposition chamber,

evaporating reactive material from the reactive material deposition source such that the reactive material passes through the aperture of the shadow mask and deposits on the surface to define an area of coverage of the reactive material, and

evaporating covering material from the covering material deposition source to produce an area of coverage of the covering material that is greater than the area of coverage of the reactive material and that includes the area of coverage of the reactive material, to enclose the reactive material coated on the substrate,

wherein when the reactive material comprises rubidium, the covering material comprises aluminum and when the reactive material comprises gallium, the covering material comprises tungsten.

28. (canceled)

29. (previously presented) The method of claim 27 wherein the surface of the substrate is within a cavity in the substrate.

30. (previously presented) The method of claim 13 wherein

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when the first material comprises rubidium, the second material comprises aluminum;
and

when the first material comprises gallium, the second material comprises tungsten.

31. (previously presented) The method of claim 21 wherein

when the first material comprises rubidium, the second material comprises aluminum;
and

when the first material comprises gallium, the second material comprises tungsten.

32. (previously presented) The method of claim 21 comprising depositing the first material from a perpendicular angle relative to the substrate surface.

33. (previously presented) The method of claim 21 comprising providing a shadow mask and positioning the shadow mask and substrate in a fixture so the shadow mask is in a position to align an aperture of the shadow mask with a portion of the substrate surface.